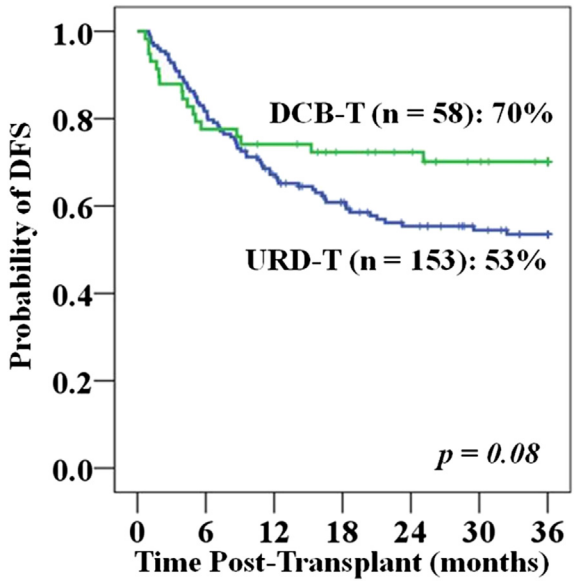
Outcome	URD-T (n = 153)	DCB-T (n = 58)	P Value
3-year TRM	25% (95%CI: 18-33)	22% (95%CI: 13-34)	0.860
3-year Relapse	22% (95%CI: 16-29)	7% (95%CI: 2-17)	0.009
3-year DFS	53% (95%CI: 45-62)	70% (95%CI: 59-83)	0.080



suggest that double-unit CB grafts may be associated with a protection against relapse. However, given there are no randomized trials comparing survival after URD-T and DCB-T, this question is a subject of ongoing controversy.

Methods: We evaluated 211 consecutive adult allograft recipients (153 URD-T and 58 DCB-T) aged 16-60 years transplanted 10/2005-12/2012 for acute leukemia in morphologic remission (115 AML/ biphenotypic, 52 ALL), MDS with ≤5% bone marrow blasts at work-up (n = 32), or advanced CML (n = 12). URD were 8-10/10 HLA-matched (89 10/10, 52 9/10, 12 8/10). CB grafts were 4-6/6 donor-recipient HLA-matched (6 6/6, 53 5/6, 57 4/6). All patients received either myeloablative or reduced intensity conditioning. GVHD prophylaxis was calcineurin-inhibitor/MMF based in DCB-T recipients whereas the majority of URD-T recipients (n = 138, 90%) received T-cell depleted (TCD) grafts.

Results: The median ages of URD-T (46 years) and DCB-T (42 years) recipients were similar (p = 0.22) and distribution of diagnoses was also similar. Neutrophil engraftment was inferior in DCB-T (95%, median 24 days) as compared to URD-T (100%, median 11 days) recipients (p <0.001), and GVHD rates were significantly higher in DCB-T as compared to TCD URD-T recipients (data not shown). Survival end-points are shown in the Table. The median (range) follow-up of survivors are similar in URD-T (46 months, 9-96) and DCB-T (42 months, 11-88) groups. While the 6-month transplant-related mortality (TRM) was higher in DCB-T (21%) versus URD-T (8%) recipients, the 3-year TRM were similar (p = 0.860). Moreover, the 3-year relapse risk was significantly decreased in DCB-T recipients (7%, p = 0.009). DCB-T recipients had a 70% 3-year DFS (p = 0.08, Figure).

Conclusions: These results provide highly encouraging preliminary data. In the absence of a large randomized trial in adult patients which will be extremely challenging to conduct in the U.S., further investigation of larger patient populations controlled for possible confounding factors is needed. However, in the interim, this data supports DCB-T (performed in centers with a strong interest in the optimal conduct of CB-T) as an immediate alternative to URD-T given the strong protection against relapse in patients with acute leukemia and other high-risk myeloid malignancies such as CML and MDS.

58

Analysis of 402 Cord Blood Units to Assess Factors Influencing Infused Viable CD34+ Cell Dose: The Critical Determinant of Engraftment

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Introduction: Criteria for selecting cord blood (CB) units with high engraftment potential are not established.

Methods: We investigated the donor variables associated with neutrophil engraftment in recipients of myeloablative double-unit CB transplantation at our transplant center (TC) and then evaluated whether these unit characteristics could be reliably determined at the time of unit selection in 402 CB units thawed at our TC from 10/2005-06/2013.

Results: The cumulative incidence of neutrophil engraftment in 130 recipients was 95% (95%CI: 90-98). In multivariate analysis, only the dominant unit infused viable CD34+ cell dose/kg independently influenced engraftment [HR 1.95, p = 0.001] (Figure). We then analyzed the components of infused viable CD34+ cell dose (i.e. post-thaw CD34+ cell count and percent viability) in 402 units (302 domestic and 100 international) from 43 Banks thawed at our TC. Bank CD34+ cell count correlated with post-thaw measurements ($r^2 = 0.6$, $p < 0.001$). The median CD34+ cell recovery was 101% but ranged 12-1480%. Recovery < 65% occurred less frequently in units from FACT-accredited Banks. Moreover, while the median post-thaw CD34+ cell viability was 92%, 33 (8%) units had < 75% viable CD34+ cells post-thaw. Bank FACT accreditation and CB unit cryovolume were significantly associated with post-thaw viability (Table). Bank location (all domestic vs. all international), shipping distance (local vs. distant international) and duration of cryopreservation were not associated with viability.

Conclusion: Infused viable CD34+ cell dose was the critical determinant of engraftment, and CD34+ cell count recovery and viability were linked to differences in banking practices. These findings have significant implications for banking and CB unit selection. At our TC, we now prioritize standard 25ml units from FACT-accredited banks and strongly consider the CD34+ cell dose. However, with such a practice, TC must be able to react to lower than expected post-thaw CD34+ cell counts and/or low CD34+ cell viability. This requires measurement of the infused viable CD34+ cell dose (or another rapidly available measure of potency) on transplant day and a back-up strategy in case of a compromised unit. This is even more critical in single-unit CBT in which engraftment is solely dependent on a single unit.

	N Units	N (%) with < 75% CD34+ Cell Viability	Univariate p value*	Multivariate p value**
FACT accreditation at time of unit collection				
Yes	259	8 (3%)	Ref.	< 0.001
No	143	25 (18%)	< 0.001	
Year of cryopreservation				
1997 - 2002	61	11 (18%)	0.009	NS
2003 - 2012	341	22 (7%)	Ref.	
Cryopreserved volume (ml)				
< 24.5	14	5 (36%)	< 0.001	0.028
24.5 - 25.5	274	8 (3%)	Ref.	
25.6 - 30	59	5 (9%)	0.06	
> 30	55	15 (27%)	< 0.001	
Method of processing				
Manual	178	22 (12%)	0.003	NS
Semi-automated	30	2 (7%)	0.62	
Automated	183	7 (4%)	Ref.	
Not RBC depleted	6	1 (17%)	0.23	
Unknown	5	1 (20%)	0.20	

* Fisher's exact test **Linear Regression

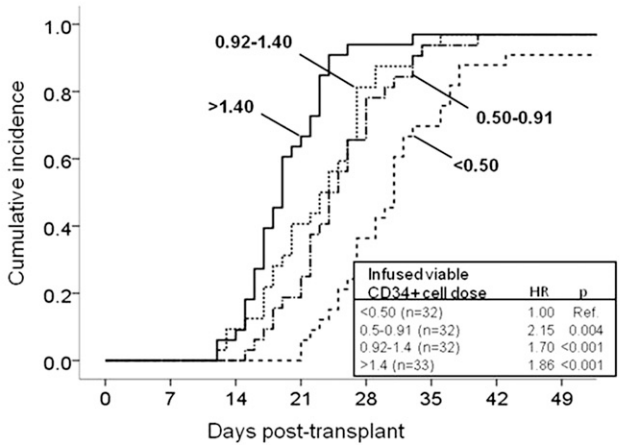

Figure. Neutrophil engraftment by dominant unit infused viable CD34+ cell dose $\times 10^5$/kg

IMMUNE RECONSTITUTION

59

Immune Reconstitution after Autologous Stem Cell Transplantation for Multiple Myeloma

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Background: High-dose chemotherapy followed by autologous stem cell transplantation (ASCT) for multiple myeloma (MM) offers a unique opportunity for the early introduction of consolidative immunotherapy to improve patient outcomes. Post-transplant reconstitution of immune cell subsets, however, occurs with disparate kinetics that can affect efficacy. A comprehensive understanding of the immunologic milieu is therefore essential to the rational development of immunotherapeutic interventions after ASCT, where relapse remains the primary cause of treatment failure.

Methods: Immune reconstitution in 40 MM patients undergoing ASCT was evaluated for one year. Peripheral blood